

WHAT IS CLAIMED IS:

1. A pressure relief device, comprising:  
  
a substantially flat flange section having a plurality of openings and defining a plane; and  
  
a domed section connected to the flange section and having a transitional line defining a change in the shape of the domed section, the transitional line disposed outside of the plane defined by the flange section.
2. The pressure relief device of claim 1, wherein the domed section is substantially linear between the flange section and the transitional line.
3. The pressure relief device of claim 1, wherein the domed section is curved between the flange section and the transitional line.
4. The pressure relief device of claim 1, wherein the flange section includes an inlet side and an outlet side and the domed section is disposed on the outlet side of the flange section.
5. The pressure relief device of claim 1, wherein the transitional line extends around the perimeter of the domed section.
6. The pressure relief device of claim 5, wherein the transitional line forms a circle in the domed section.
7. The pressure relief device of claim 1, wherein the flange section has a rectangular shape and the domed section includes a plurality of transitional lines, one of the plurality of transitional lines aligning with each of the corners of the flange section.

8. The pressure relief device of claim 1, wherein the domed section includes a plurality of notches disposed adjacent the transitional line.

9. A pressure relief device, comprising:

a substantially flat flange section having a plurality of openings;

a domed section joined with the flange section and having a concave surface and a convex surface, a transitional line defining a change in the shape of the domed section, and a plurality of notches disposed adjacent the transitional line.

10. The pressure relief device of claim 9, wherein the domed section is substantially linear between the flange section and the transitional line.

11. The pressure relief device of claim 9, wherein the domed section is curved between the flange section and the transitional line.

12. The pressure relief device of claim 9, wherein the transitional line extends around the perimeter of the domed section.

13. The pressure relief device of claim 12, wherein the transitional line forms a circle in the domed section.

14. A pressure relief device, comprising:

a substantially flat flange section having a rectangular shape and a plurality of openings; and

a domed section joined with the flange section and having a transitional line extending along the perimeter of the domed section and defining a change in the shape of the domed section, the transitional line forming a circle in the domed section.

15. The pressure relief device of claim 14, wherein the flange section defines a plane and the transitional line is disposed outside of the plane defined by the flange.

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16. The pressure relief device of claim 14, wherein the domed section is substantially linear between the flange section and the transitional line.

17. The pressure relief device of claim 14, wherein the domed section is curved between the flange section and the transitional line.

18. A pressure relief assembly, comprising:

a frame;

a pressure relief device including:

a substantially flat flange section configured to engage the frame, the flange section defining a plane and having a plurality of openings; and

a domed section joined with the flange section and having a transitional line defining a change in the shape of the domed section, the transitional line disposed outside of the plane defined by the flange section; and

a plurality of fasteners, one of the plurality of fasteners disposable through one of the plurality of openings in the flange to secure the pressure relief device to the frame.

19. The pressure relief assembly of claim 18, further including a gasket disposed between the flange section and the frame.

20. The pressure relief assembly of claim 18, wherein the flange section has an inlet side and an outlet side and the inlet side engages the frame.

21. The pressure relief assembly of claim 20, wherein the domed section is disposed on the outlet side of the flange section.

22. The pressure relief assembly of claim 20, wherein a second frame is disposed on the outlet side of the flange section.

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23. The pressure relief assembly of claim 18, wherein the domed section is substantially linear between the flange section and the transitional line.

24. The pressure relief assembly of claim 18, wherein the domed section is curved between the flange section and the transitional line.

25. The pressure relief assembly of claim 18, wherein the flange section includes an inlet side and an outlet side and the domed section is disposed on the outlet side of the flange section.

26. The pressure relief assembly of claim 18, wherein the transitional line extends around the perimeter of the domed section.

27. The pressure relief assembly of claim 26, wherein the transitional line forms a circle in the domed section.

28. The pressure relief assembly of claim 18, wherein the domed section includes a plurality of notches disposed adjacent the transitional line.

29. A pressure relief device, comprising;

- a first structure having a substantially flat flange section and a projection extending from the flange section;
- a second structure having a domed shape and an outer edge; and
- a bracket having a body portion configured to be securely engaged with the projection of the first structure and a support configured to engage the outer edge of the second structure.

30. The pressure relief device of claim 29, wherein the bracket includes at least one tab configured to be securely engaged with the second structure and further configured to withstand a predetermined tensile force.

31. The pressure relief device of claim 30, wherein the second structure includes a notch configured to receive the at least one tab.

32. The pressure relief device of claim 30, wherein the first structure includes a concave surface and a convex surface and the tab is securely engaged with the convex surface.

33. The pressure relief device of claim 30, wherein the bracket extends along the entire perimeter of the first structure.

34. The pressure relief device of claim 33, wherein the bracket includes a plurality of tabs configured to be securely engaged with the second structure.

35. The pressure relief device of claim 29, wherein the support of the bracket includes a pair of guides.

36. The pressure relief device of claim 35, wherein the guides extend at an angle relative to the body portion.

37. The pressure relief device of claim 29, wherein the support is substantially perpendicular to the body portion.

38. The pressure relief device of claim 29, wherein the body portion of the support is spot welded to the first structure.

39. A method of making a pressure relief device, comprising:  
forming a pressure relief device having a substantially flat flange section and a domed section;

separating the pressure relief device into a first structure having the flat flange and a second structure having at least a portion of the domed section;

securing a bracket having a support to the first structure; and

engaging the second structure with the support of the bracket.

40. The method of claim 39, wherein the bracket is spot welded to the first structure.

41. The method of claim 39, further including the step of securing the second structure to the bracket.

42. A pressure relief device, including:  
a substantially flat flange section;  
a central section connected to the substantially flat flange section;  
a line of weakness formed in the domed section, the line of weakness extending around a portion of the dome and terminating in two end points; and  
a stress distribution feature disposed substantially transversely to the line of weakness at each of the two end points of the line of weakness.

43. The pressure relief device of claim 42, wherein the stress distribution feature is a line of weakness.

44. The pressure relief device of claim 42, wherein the central section has a domed shape with a concave surface and a convex surface and the line of weakness is formed in the convex surface.

45. The pressure relief device of claim 42, further including a plurality of stress distribution features disposed at each of the two end points of the line of weakness.

46. The pressure relief device of claim 42, wherein each stress distribution feature has a substantially arcuate shape.

47. The pressure relief device of claim 46, wherein each stress distribution feature terminates at a small hole.

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48. A fastener for engaging a pressure relief device with a frame, comprising:  
a body portion configured to engage the frame;  
a head portion having an opening configured to receive the body portion  
and a contact surface configured to engage the pressure relief device; and  
a wire connecting the body portion to the head portion, the wire configured  
to break and release the head portion when a predetermined force is exerted on the  
head portion.

49. The fastener of claim 48, wherein the head portion includes a flange  
having the contact surface.

50. The fastener of claim 48, wherein the body portion includes threads.

51. The fastener of claim 48, wherein each of the body portion and head  
portion include a central opening and the wire is disposed within the central opening of  
both the body portion and the head portion.

52. The fastener of claim 51, wherein a first locking member is securely fixed  
to a first end of the wire and is configured to engage the head portion and a second  
locking member is securely fixed to the second end of the wire and is configured to  
engage the body portion.

53. The fastener of claim 48, further including a pin selectively engageable  
with the body portion and the head portion to secure the body portion to the head  
portion.

54. The fastener of claim 53, wherein each of the body portion and head  
portion includes a pin opening configured to receive the pin.

55. The fastener of claim 48, wherein the opening in the head portion has a hexagonal shape configured to receive a corresponding hexagonal protrusion on the body portion.

56. A pressure relief assembly, comprising:

- a frame;
- a pressure relief device having a flange configured to engage the frame, the flange including at least one opening; and
- a fastener having:
  - a body portion fixably connected to the frame and having a central opening;
  - a head portion having an opening engageable with the body portion to secure the pressure relief device to the frame; and
  - a wire connecting the body portion to the head portion, the wire configured to break and release the head portion when the flange exerts a predetermined force on the head portion.

57. The pressure relief assembly of claim 56, wherein a pin is disposed transversely to the central opening of the body portion and the wire loops around the pin.

58. The pressure relief assembly of claim 57, wherein a pair of locking members are secured to each end of the wire.

59. The pressure relief assembly of claim 56, wherein a plurality of fasteners are disposed around the frame and are flange of the pressure relief device.

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60. The pressure relief assembly of claim 56, further including a gasket disposed between the flange of the pressure relief device and the frame.

61. The pressure relief assembly of claim 56, wherein the pressure relief device is an explosion panel.

62. The pressure relief assembly of claim 56, wherein the body portion includes an opening and the head portion includes an opening configured to align with the opening in the body portion, the wire disposable through the opening in the head portion and the opening in the body portion to secure the head portion to the body portion.

63. The pressure relief assembly of claim 56, wherein the body portion includes threads.

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